California Energy Commission
Public Interest Energy Research (PIER) Program
ENVIRONMENTAL AREA RESEARCH

Adaptation Strategies for Agricultural Sustainability in Yolo County

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PIER Environmental Research
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Fact Sheet

The Issue

California leads the nation in agricultural production, in legislation affecting air and water quality within agriculture, and, most recently, in policies for climate change mitigation and adaptation. Preparing for climate change provides opportunities for incorporating land stewardship and sustainability practices into agricultural planning.

Developing an awareness of the impacts on climate change due to agricultural activities will help inform strategies for climate change mitigation and adaptation. Carbon sequestration, a mitigation strategy involving the long-term storage of carbon, can provide potential carbon offsets for energy producers in future cap-and-trade markets.

Project Description

This project will investigate the broad mechanisms by which agriculture may be affected by climate change. Other simultaneous changes in landscape pressures will also be examined, such as changes in profit potentials across products and goods, and population growth and urbanization. A case study will be set up to examine climate change scenarios using interpretations of geographic information system (GIS) layers for ecological, agricultural, urban planning, and natural resource indicators.

These scenarios, based on information from the International Panel on Climate Change (IPCC) for high and low greenhouse gas emissions, will form the basis for projections of changes in agricultural production, ecosystem services, and land use.

An aerial view of Russell Ranch at UC Davis
Image Credit: UC Davis; photo taken by Ford Denison

The case study is for Yolo County, California, which represents a cross-section of the Central Valley agricultural landscape. Climate modeling data from the 2008 Scenarios Project will be used to describe spatial and temporal changes in temperature and precipitation across Yolo County.

The project's goals are to:

- Compile GIS maps to determine the direct effects of, and adaptive responses to, climate change scenarios in Yolo County's agricultural landscape.
- Examine the viability of mitigation strategies that would provide carbon offsets for energy producers in future climates.

- Examine possible outcomes of adaptation by landowners and policy makers regarding climate change effects on agricultural goods and productivity, impacts of alternative agricultural management, ecosystem restoration and biodiversity, and social and aesthetic values.
- Engage an interdisciplinary team and do an economic analysis to make hypotheses about the consequences of decisions relating to changes in ecosystem services.
- Develop a set of map overlays and a guided map tour of Yolo County using Google™ Earth that highlights vulnerabilities and responses for mitigation and adaptation.

PIER Program Objectives and Anticipated Benefits for California

This research will help guide California's agricultural sector in its efforts to reduce and adapt to climate change. California agriculture has the potential to reduce greenhouse gas emissions within its own sector, as well as to help reduce emissions from other sources, such as energy producers.

Understanding climate-related agricultural change is crucial for the development of realistic climate projections for California. These projections are needed to prepare for future changes in energy demand and generation and to identify the capacity of California's agricultural systems to provide energy offsets in potential future cap-and-trade markets.

Project Specifics

Contract Number: 500-09-009
Contractor: UC Davis
Contract Amount: $290,000
Contract Term: Dec. 2009 to Dec. 2011

For more information, please contact:

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